

Performance of calves receiving a by-product of the babassu oil palm during the dry season in an integrated pasture-forestry system in the pre-Amazon region of Brazil

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Introduction

Integration of farming, livestock and forestry constitutes a viable alternative for the advancement of sustainable agriculture through its effects on social and ecological processes. Silvopastoral systems are integrated systems characterized by the management of animals in an agriculture-forestry association. These systems aim to stabilize forage production for meat and/or milk production and provide forestry products as well as various environmental services, such as shade for animals (Maurício et al. 2010). Despite the benefits mentioned, the seasonality in the production of tropical forages needs to be considered. An efficient way to avoid losses in animal production in the dry season is with the use of supplementation, e.g. soybean meal. However, other by-products from agri-business with high nutritional value are often not recovered and rather discarded, sometimes harming the environment. The use of these residues in animal feed can reduce environmental impacts and the cost of animal feed.

The aim of this study was to evaluate the performance of cattle in a silvopastoral system in the dry season, supplemented with babassu meal, a by-product of the native oilpalm, babassu (*Orbygnia phalerata*, syn. *Attaleia speciosa*).

Methods

The experiment was conducted in the pre-Amazon region (transitional zone bordering the Amazon rain forest), at Tank Farm property in the municipality of Matinha, Maranhão, Brazil (45°06'25" W, 02°59'35" S), in an Aw climate according to the Köppen classification. The pasture grass used was *Brachiaria brizantha* cv. Marandu in a silvopastoral system with babassu as the tree component. Soil fertility for the pasture was corrected with lime, superphosphate as P source, potassium chloride as K source and urea as N source, according to soil test-based recommendations. We used a 3 x 3 factorial design: 3 tree densities (39, 72 and 92 palms per hectare); and 3 levels of replacement of soybean meal by babassu meal: 10, 20 and 30%, allocated in a completely randomized design. The diets were isonitrogenous and the supplement concentrate was provided every morning at a rate of 2% of the test animals' body weight.

The pasture was continuously grazed. Available herbage mass and sward structural components were monitored by two 1-m² samplings at 3 points in each paddock, during the experimental period (data not presented). The experimental period was 76 days, with 10 days of adaptation and 66 days of evaluation (from 2 December 2012 to 6 February 2013), the dry season in the region.

The experimental units were 27 Nelore Guzonel cattle, 9–10 months old and of approximately 200 kg initial weight. The animals were allocated to 9 groups, which were allocated into 9 paddocks of 0.61 ha. Animals were weighed every 2 weeks after a 16-h fast. Data were analyzed by the statistical program InfoStat[®] (Infostat Statistical Software, Córdoba, Argentina).

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Results and Discussion

Data on weight gain of animals receiving different levels of babassu meal to replace soybean meal, on pastures with different densities of the babassu palm are found in Table 1. There was no statistical difference ($P>0.05$) between treatments, and no interaction. These results corroborate those obtained by Castro (2012), who evaluated the addition of increasing levels of babassu meal as a substitute for sugar cane for heifers and found that the final weight of the heifers was not altered by the diets. However, in her study the average daily gain of the animals had a quadratic relationship, with the greatest average daily gain (ADG) when feeding 19% babassu meal. Xenofonte et al. (2008) evaluated the performance of lambs fed diets containing different levels of babassu meal bran (0, 10, 20 and 30% on a DM basis) and observed a linear decrease of ADG with increasing babassu proportion. However, Castro (2012) reported that the inclusion of 15% babassu meal in place of soybean meal in the diet of dairy cows produced no differences in ADG.

Table 1. Total weight gain (kg/animal) during the experiment (66 days). There were no significant differences ($P>0.05$).

Replacement levels	Density of palm trees (no./ha)		
	92	72	36
30% babassu meal	34.2	49.7	49.5
20% babassu meal	49.2	45.2	39.5
10% babassu meal	44.8	57.0	42.2

In our experiment, the cost of 100 kg feed supplement was R\$ 94.36, 92.55 and 90.67 for the 3 replacement levels by babassu meal, respectively.

Conclusion

We conclude that replacing up to 30% of soybean meal with babassu meal and a tree density of up to 92 babassu palms/ha in pastures did not interfere with weight gain of cattle. Due to local-market availability and lower price compared with soybean meal, babassu meal is a promising option for inclusion in the diet of ruminants.

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